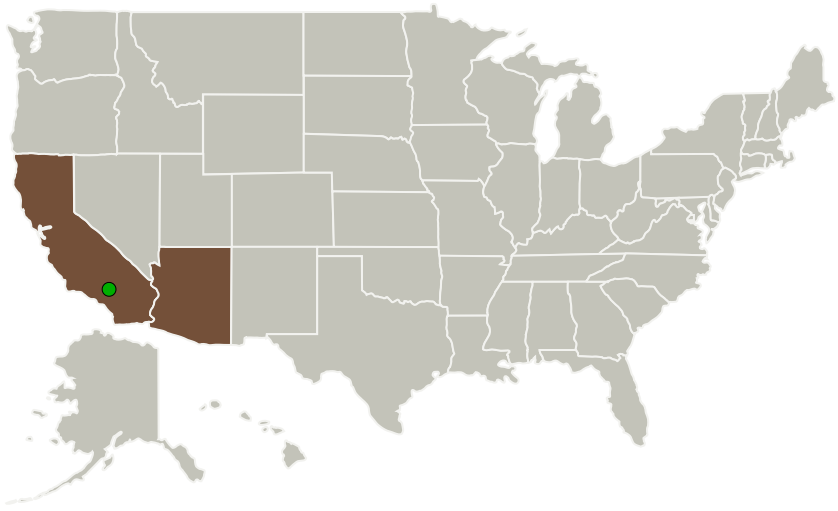
Experimental Model Based Feedback Control for Flutter Suppression and Gust Load Alleviation, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

ZONA Technology, Inc. (ZONA) proposes an R\&D effort to develop an Experimental Model Based Feedback Control (EMBFC) Framework for the flutter suppression and gust load alleviation (GLA). The resilience of the flight control law in the presence of aeroelastic/aeroservoelastic (AE/ASE) interactions can therefore be increased by the suppression of the aircraft's structural vibrations induced by the flutter mechanism and/or gust perturbation. Currently aircrafts with non-adaptive control laws usually include roll-off or notch filters to avoid AE/ASE interactions. However, if changes in the aircraft configuration are significant, the frequencies of the flexible modes of the aircraft may be shifted and the notch filters could become totally ineffective. With the proposed EMBFC framework, the flexible dynamics can be consistently estimated via system identification algorithms and its undesirable effects is suppressed through a robust feedback control law, while the whole systems stability is being maintained. The proposed feedback control technique will be demonstrated with SuperSonic SemiSpan Transport S4T wind tunnel model for flutter suppression and gust load alleviation.

Primary U.S. Work Locations and Key Partners



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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
ZONA Technology, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Scottsdale, Arizona
Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations	
Arizona	California

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138145)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

ZONA Technology, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

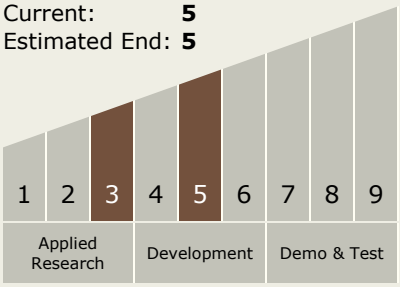
Carlos Torrez

Principal Investigator:

Boris Moulin

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.8 Ground and Flight Test Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System